AMENDMENT UNDER 37 C.F.R. § 1.312 Attorney Docket No.: Q88252

U.S. Patent Application No.: 10/537,054

## AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

## LISTING OF CLAIMS:

1. (currently amended): A torsional vibration suppressing control method in an electric motor speed control system constituted by a mechanism for transmitting a driving torque from an electric motor to a load through a driving shaft which is provided on the load side of the electric motor and has a low torsional rigidity, and a control device for feeding back an electric motor mean speed N<sub>MAVG</sub> obtained by a calculation for a mean value every constant cycle for an electric motor speed detection signal detected by a speed detector for a speed command N<sub>REF</sub> and calculating a deviation signal, and controlling a current of the electric motor in order to have an electric motor torque in accordance with a torque command signal T<sub>RFA</sub> obtained by amplifying the deviation signal by means of a speed controller having a proportional gain and an integrator or only the proportional gain,

wherein a signal obtained by multiplying a signal acquired by differentiating the electric motor mean speed signal  $N_{MAVG}$  by an inertia time constant  $\tau_M$  of the electric motor portion is input as an electric motor acceleration torque signal  $T_{MAFB}$  to an inertia controller with respect to the torque command signal  $T_{RFA}$  output from the speed controller, and

the inertia controller multiplies the electric motor acceleration torque  $T_{MAFB}$  by the proportional gain and then outputs a value thus obtained as an inertia control signal  $T_{MJC}$  through a second-order or first-order low-pass filter and a second-order or first-order high-pass filter,

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feeds back the electric motor acceleration torque signal  $T_{MAFB}$  to an electric motor acceleration torque command  $T_{RFAX}$  obtained by decreasing the inertia control signal  $T_{MJC}$  from the torque command signal  $T_{RFA}$  output from the speed controller, and controls a current of the electric motor in order to have an electric motor torque in accordance with a signal  $T_{RFM}$  obtained by adding, to the acceleration torque command  $T_{RFAX}$ , a torque compensation signal  $T_{RFL}$  acquired by amplifying a signal of a deviation thereof by means of an electric motor acceleration torque controller constituted by the proportional gain and the integrator, thereby carrying out a control in order to cancel an electric motor load torque in response to the torque compensation signal  $T_{RFL}$  calculated and output in such a manner that the torque command signal  $T_{RFA}$  output from the speed controller the electric motor acceleration torque command  $T_{RFAX}$  and the electric motor acceleration torque feedback signal  $T_{MAFB}$  are coincident with each other and equivalently enlarging and controlling an inertia of the electric motor portion.

- 2. (original): The torsional vibration suppressing method in an electric motor speed control system according to claim 1, wherein a proportional gain of the inertia controller is set to have a negative value of 0 to -1, thereby equivalently reducing and controlling the inertia of the electric motor portion.
- 3. (currently amended): An electric motor control apparatus constituted by speed detecting means for detecting an electric motor speed, a mechanism for transmitting a driving torque from an electric motor to a load through a driving shaft which is provided on the load side

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of the electric motor and has a low torsional rigidity, and a control device for feeding back an electric motor mean speed  $N_{MAVG}$  obtained by a calculation for a mean value every constant cycle for an electric motor speed detection signal detected by a speed detector for a speed command  $N_{REF}$  and calculating a deviation signal, and controlling a current of the electric motor in order to have an electric motor torque in accordance with a torque command signal  $T_{RFA}$  obtained by amplifying the deviation signal by speed control means having a proportional gain and an integrator or only the proportional gain, comprising:

inertia control means for calculating and outputting an inertia control signal  $T_{MJC}$  by an inertia controller from an electric motor acceleration torque signal  $T_{MAFB}$  obtained by multiplying a signal acquired by differentiating the electric motor mean speed signal  $N_{MAVG}$  by an inertia time constant  $\tau_M$  of the electric motor portion;

electric motor acceleration torque control means having a proportional gain and an integrator for calculating a torque command compensation signal  $T_{RFL}$  from a deviation signal of a signal  $T_{RFAX}$  obtained by decreasing the electric motor inertia control signal  $T_{MJC}$  from the torque command signal  $T_{RFA}$  to be an output signal of the speed control means and the electric motor acceleration torque signal  $T_{MAFB}$ ; and

electric motor torque control means for controlling a current of the electric motor in order to obtain an electric motor torque in accordance with a torque command  $T_{RFM}$  to be a sum of the torque command signal  $T_{RFA}$  to be an output signal of the speed control means the electric motor acceleration torque command  $T_{RFAX}$  and the torque command compensation signal  $T_{RFL}$  to be an output signal of the electric motor acceleration torque control means.